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TITLE: METHOD AND APPARATUS FOR CUTTING SEMICONDUCTOR PACKAGE

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide a method and an apparatus for cutting a semiconductor package, without having to increase the number of steps or needing masks.

SOLUTION: For cutting a substrate 2 which has a plurality of mounted semiconductor chips 4 into a plurality of individual semiconductor chips 4, a camera 7 and a recognition circuit 8 recognize the cutting pattern of the substrate 2, an arithmetic circuit 9 specifies cutting positions using the recognition result by the recognizer circuit 8, a control circuit 10 and a drive circuit 11 are driven according to the computed result, and a nozzle 15 and a stage 6 are relatively moved, while feeding a blasting material from a discharging part 12 to the nozzle 15, thereby jetting cutting grains 16 against the substrate 2 from the nozzle 15 to cut the substrate 2.

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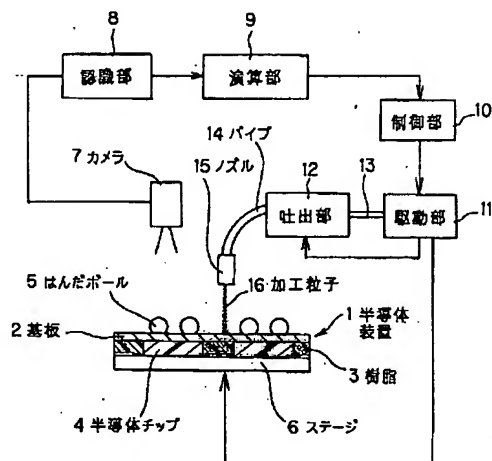
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(54) 【発明の名称】 半導体パッケージの切断方法および装置

(57) 【要約】

【課題】 工程数を増すことなく、マスクを必要としない半導体パッケージの切断方法および装置を提供する。

【解決手段】 複数の半導体チップ4を搭載した1枚の基板2を切断して複数の半導体チップ4を個片化するに際し、基板2の切断パターンをカメラ7および認識回路8で認識する。認識回路8による認識結果を用いて切断位置を演算回路9により特定し、この演算結果に応じて制御回路10および駆動回路11を駆動し、吐出部12からブラスト材をノズル15へ供給しながらノズル15とステージ6を相対移動させ、その過程でノズル15より加工粒子16を基板2上に噴射させて基板2を切断する。



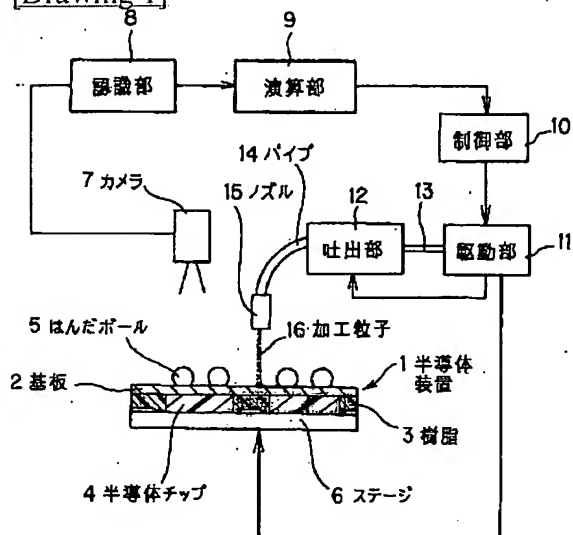
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## DRAWINGS

[Drawing 1]



[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the cutting process and equipment of a semiconductor package for cutting two or more semiconductor packages carried on one substrate by blasting for each semiconductor package of every about the cutting process and the equipments of a semiconductor package, such as a BGA (Ball Grid Array) package.

[0002]

[Description of the Prior Art] When two or more semiconductor chips cut a semiconductor device [ finishing / mounting ] according to an individual for every chip on one substrate, generally the cutting equipment conventionally cut while rotating the dicing saw (or dicing blade) of a disk type was used, and it came. In cutting using a dicing saw, the substrate which the semiconductor chip stuck UV sheet of larger size than a substrate on the rear face of a substrate [ finishing / mounting ], and stuck UV sheet is positioned on a stage. Subsequently, only a substrate is cut for a dicing saw in the direction of X along a cutting location, and it is made not to cut UV sheet. Thus, sequential execution of the cutting of the direction of X is carried out also to other direction cutting locations of X. After all cutting of the direction of X is completed, a stage is rotated 90 degrees and sequential execution of the cutting of the direction of Y is carried out similarly. Thereby, a substrate is cut like the squares for every chip.

[0003] Moreover, there is blasting as other cutting process and the manufacture approach, cutting process, and cutting equipment using this are proposed by JP,57-117242,A, JP,10-256450,A, etc. This blasting cuts by spraying the abrasive using a detailed solid particle on a cutting location through a mask with opening.

[0004]

[Problem(s) to be Solved by the Invention] However, it is necessary to stick UV sheet on the rear face of a substrate, and, according to a conventional cutting process and the equipment of a semiconductor package, in the case of the cutting equipment using a dicing saw, the process for attachment increases. On the other hand, with the cutting equipment using blasting, since the mask with opening according to a cutting pattern is used, a HOTORISO process including sensitization, development, and etching is needed.

[0005] Therefore, the purpose of this invention is to offer the cutting process and equipment of a semiconductor package which do not need a mask, without increasing a routing counter.

[0006]

[Means for Solving the Problem] In the cutting process of the semiconductor package which cuts one substrate in which two or more semiconductor packages were carried as the 1st description, and piece [ of an individual ]-izes said two or more semiconductor packages in order that this invention may attain the above-mentioned purpose The nozzle from which the cutting pattern of said one substrate is recognized, the abrasive for cutting is injected according to said cutting pattern, and said one substrate is cut is arranged to a position to said one substrate. The cutting process of the semiconductor package characterized by making said abrasive for cutting inject from said nozzle arranged at said position is

offered.

[0007] According to this approach, a substrate is cut for two or more semiconductor packages of every by making the abrasive for cutting inject from said nozzle, recognizing the cutting pattern of one substrate in which two or more semiconductor packages were carried, and arranging a nozzle according to this cutting pattern. Thereby, a routing counter does not increase for substrate cutting. Moreover, since the mask of dedication is not needed on the occasion of cutting, a running cost can be reduced.

[0008] Moreover, this invention is set to the cutting equipment of the semiconductor package which cuts one substrate in which two or more semiconductor packages were carried as the 2nd description, and piece[ of an individual ]-izes said two or more semiconductor packages in order to attain the above-mentioned purpose. A recognition means to recognize the cutting pattern of said one substrate, and an arrangement means to arrange to a position the nozzle from which the abrasive for cutting is injected according to said cutting pattern, and said one substrate is cut to said one substrate, The cutting equipment of the semiconductor package characterized by having an injection means to make said abrasive for cutting inject from said nozzle arranged at said position is offered.

[0009] According to this configuration, the cutting pattern of one substrate in which two or more semiconductor packages were carried is recognized by the recognition means, and a nozzle is arranged by the arrangement means at the position on a substrate according to the recognized cutting pattern. By the injection means, the abrasive for cutting is injected on a substrate and a substrate is cut from the arranged nozzle for two or more semiconductor packages of every. Thereby, a routing counter is not made to increase for substrate cutting. Moreover, since the mask of dedication is not needed on the occasion of cutting, a running cost can be reduced.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing. Drawing 1 shows the cutting equipment of the semiconductor package of this invention. The semiconductor device 1 for cutting (BGA package) is formed in the predetermined location of the field of the substrate 2 with which the mark for positioning (un-illustrating) was prepared in the predetermined location, two or more semiconductor chips 4 pasted up on one side of this substrate 2 with resin 3, and another side of a substrate 2, is equipped with two or more solder balls 5 electrically connected to the pad of a semiconductor chip 4 through the substrate 2, and is constituted. A semiconductor device 1 is carried on X-Y stage (or table) 6 at the time of cutting, and is fixed by means by which it does not illustrate.

[0011] The cutting equipment of a semiconductor package is equipped with a camera 7, the recognition circuit 8, an arithmetic circuit 9, a control circuit 10, the drive circuit 11, a discharge part 12, a link 13, a pipe 14, and a nozzle 15, and is constituted. A camera 7 uses CCD etc. for an image sensor, is constituted, photos a semiconductor device 1 from the upper part, and outputs the video signal. The recognition circuit 8 analyzed the video signal from a camera 7, has recognized the location (or arrangement pattern) of the solder ball 5, the mark on a substrate 2, etc., and is equipped with memory 8a which memorizes this recognition result. An arithmetic circuit 9 computes the location which should cut a substrate 2 based on the recognition result of the recognition circuit 8, and stores a calculation result in memory 8a if needed. A control circuit 10 controls the drive circuit 11 based on the result of an operation of an arithmetic circuit 9. The drive circuit 11 is connected with the discharge part 12 through the link 13, and can make arbitration move the nozzle 15 combined with the discharge part 12 in the direction of X, and the direction of Y. A discharge part 12 leads the abrasive by very fine particles, such as a ceramic and glass, to a nozzle 15 through a pipe 14 by high-pressure Ayr, and is equipped with the electro-magnetic valve to the nozzle 15 of abrasive which performs on-off control of supply. A high-pressure air pump, its control device, the air tank, the blasting tank that contains abrasive are connected to the discharge part 12 (neither is illustrated). From a nozzle 15, abrasive serves as the processing particle 16 and is injected at high speed on a substrate 2.

[0012] In the above configuration, when cutting, as the solder ball 5 turns up, it carries the semiconductor device 1 for cutting in a stage 6, and fixes a semiconductor device 1 to a predetermined location. Subsequently, the whole top face of a semiconductor device 1 is photoed with a camera 7. The

video signal of a camera 7 is incorporated in the recognition circuit 8, and recognizes the location of the solder ball 5, the mark on a substrate 2, etc. as a specifying point. Based on this recognition result, an arithmetic circuit 9 calculates calculation of calculation of the direction of X and Y, and the physical relationship of the solder ball 5 to a cutting plane line, the direction of X and Y, the include angle between cutting plane lines, etc. from the mark on a substrate 2. Thereby, the root which scans a nozzle 15 (migration) is determined. A control circuit 10 controls the drive circuit 11 according to the information from an arithmetic circuit 9. The drive circuit 11 makes the basis of control of a control circuit 10 move in X and the direction of Y in a discharge part 12 so that a nozzle 15 may carry out continuation migration along with a cutting plane line. After a nozzle 15 moves to the start point of cutting, open the bulb of a discharge part 12, the processing particle 16 is made to breathe out from a nozzle 15, and migration of a discharge part 12 is started to coincidence. The slot which a substrate front face is dug one by one according to the friction impulse force, and reaches the base of a substrate 2 produces the processing particle 16 breathed out from the nozzle 15 in order to collide with a substrate front face at high speed. If a nozzle 15 arrives at the terminal point of cutting, a bulb will be closed, and cutting is stopped. Then, a nozzle 15 is moved to the cutting starting position of the following cutting plane line. It performs repeatedly until the object of cutting of this actuation is lost.

[0013] In addition, in the gestalt of the above-mentioned implementation, although it shall cut by moving a discharge part 12 and a nozzle 15 in X and the direction of Y, you may be the configuration for which makes immobilization a discharge part 12 and a nozzle 15, and a stage 6 is moved in X and the direction of Y. Or you may be the configuration to which both a nozzle 15 and the stage 6 are moved.

[0014] Moreover, these can also be made into one unit by the microcomputer although the recognition circuit 8, the arithmetic circuit 9, and the control circuit 10 were constituted as a part for a different circuit. Moreover, a camera 7 may be omitted and the mark of the pattern of the solder ball 5 or a substrate 2 may be beforehand stored in X memory.

[0015] Furthermore, in the gestalt of the above-mentioned implementation, although the nozzle 15 shall be fixed through a pipe 14, only a nozzle 15 may be made the configuration moved in X and the direction of Y on a semiconductor device, changing to the hose of a configuration of that a pipe 14 can be borne with flexibility at high-pressure air, and making a discharge part 12 immobilization. And injecting continuously on a cutting plane line at a line can also inject injection of the processing particle 16 in the shape of a dotted line.

[0016] moreover, the thing by which this invention is limited to BGA although the BGA package was made into the example as a semiconductor device 1 -- it is not -- CSP (Chip Size Package), FC (Flip Chip), PBGA (Plastic Ball Grid Array), and TBGA (Tape Ball Grid Array) etc. -- it is widely applicable.

[0017]

[Effect of the Invention] Since a routing counter is not increased since the abrasive for cutting processing was injected in the cutting location which has recognized the cutting pattern of a semiconductor device and was pinpointed using this recognition result according to the cutting process and equipment of a semiconductor package as explained above, and a mask is not used, a running cost can be reduced. Furthermore, automatic disconnect becomes possible. Moreover, since modification of a cutting location can be simply performed based on a cutting pattern, it excels in versatility.

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CLAIMS

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[Claim(s)]

[Claim 1] In the cutting process of the semiconductor package which cuts one substrate in which two or more semiconductor packages were carried, and piece[ of an individual ]-izes said two or more semiconductor packages The nozzle from which the cutting pattern of said one substrate is recognized, the abrasive for cutting is injected according to said cutting pattern, and said one substrate is cut is arranged to a position to said one substrate. Cutting process of the semiconductor package characterized by making said abrasive for cutting inject from said nozzle arranged at said position.

[Claim 2] The solder ball of two or more BGA packages as said two or more semiconductor packages with which recognition of said cutting pattern has been arranged on said one substrate, It carries out by picturizing with a camera the mark formed in said one substrate. Or the arrangement to said position of said nozzle Cutting process of the semiconductor package according to claim 1 performed by migration of the X-axis of the X-Y stage which laid migration of said nozzle, or said one substrate, and Y shaft orientation.

[Claim 3] In the cutting equipment of the semiconductor package which cuts one substrate in which two or more semiconductor packages were carried, and piece[ of an individual ]-izes said two or more semiconductor packages A recognition means to recognize the cutting pattern of said one substrate, and an arrangement means to arrange to a position the nozzle from which the abrasive for cutting is injected according to said cutting pattern, and said one substrate is cut to said one substrate, Cutting equipment of the semiconductor package characterized by having an injection means to make said abrasive for cutting inject from said nozzle arranged at said position.

[Claim 4] The camera which picturizes the mark formed in the solder ball of two or more BGA packages as said two or more semiconductor packages with which said recognition means has been arranged on said one substrate, or said one substrate, Said arrangement means is cutting equipment of the semiconductor package according to claim 3 characterized by being the drive circuit to which the X-Y stage which laid said nozzle or said one substrate is moved including the recognition circuit which processes the output signal of said camera.

[Claim 5] The memory which stored the mark formed in the pattern of the solder ball of two or more BGA packages as said two or more semiconductor packages with which said recognition means has been arranged on said one substrate, or said one substrate, Said arrangement means is cutting equipment of the semiconductor package according to claim 3 characterized by being the drive circuit to which the X-Y stage which laid said nozzle or said one substrate is moved including the recognition circuit which reads and recognizes said pattern or said mark from said memory.

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[Translation done.]